



National Weather Service



WFO Little Rock, AR

Surveying Techniques for the Long-Track EF4 Tornado in Arkansas On February 5, 2008

Presented at the 2009 National Severe
Weather Workshop
March 7, 2009

John Robinson
Warning Coordination Meteorologist

There had to be a better way

- ◆ **Consideration had been given to using GIS applications**
- ◆ **An ideal opportunity presented itself on February 5, 2008**

The Super Tuesday Outbreak

February 5, 2008



**Path length = 121.84 miles*
(State Record)**

Creation of GIS Datasets

- ◆ **What format to use?**
 - ◆ **ArcGIS or Google Earth**
 - ◆ **Pros and cons to each approach**
 - ◆ **We decided to do both**
- ◆ **Data sets created in Google Earth
KML format**
- ◆ **KML data sets converted to ArcGIS
shapefiles**
- ◆ **KML file updated nightly**

Who Needed This Data?

- ◆ **Emergency Management (state and county)**
- ◆ **Arkansas Geographic Information Office**
- ◆ **Arkansas Governor's Office**
- ◆ **Arkansas Forestry Commission**
- ◆ **Tax Assessors**

Immediately after the event

- ◆ **We were bombarded with media questions**
 - ◆ **How many tornadoes? How many injuries? How many deaths?**
- ◆ **Storm track data was needed for relief efforts**
 - ◆ **Relief efforts were taking place at the national, state, and local levels**
 - ◆ **What areas were hardest hit?**

The Initial Task

- ◆ **Overlay radar onto Google Earth**
- ◆ **Plot up the track of the rotation**
- ◆ **This was our “first guess” as to where a tornado may have tracked**
 - ◆ **Data was not very accurate and was based solely upon radar signatures**
- ◆ **This was primarily for use by our damage survey teams so they would know where to look**
- ◆ **Some of this data was initially shared with first responders and relief workers**

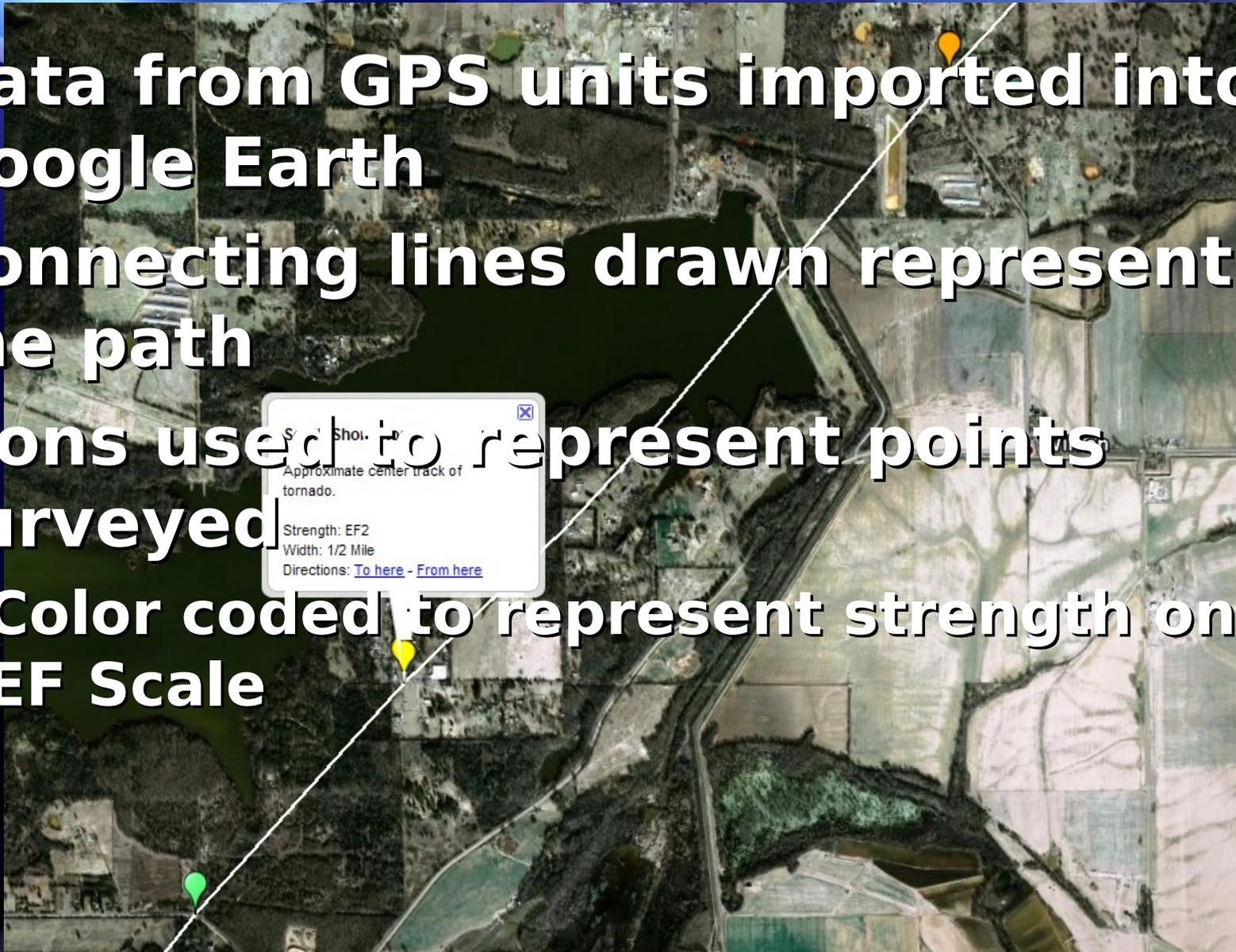
February 6, 2008

One day after

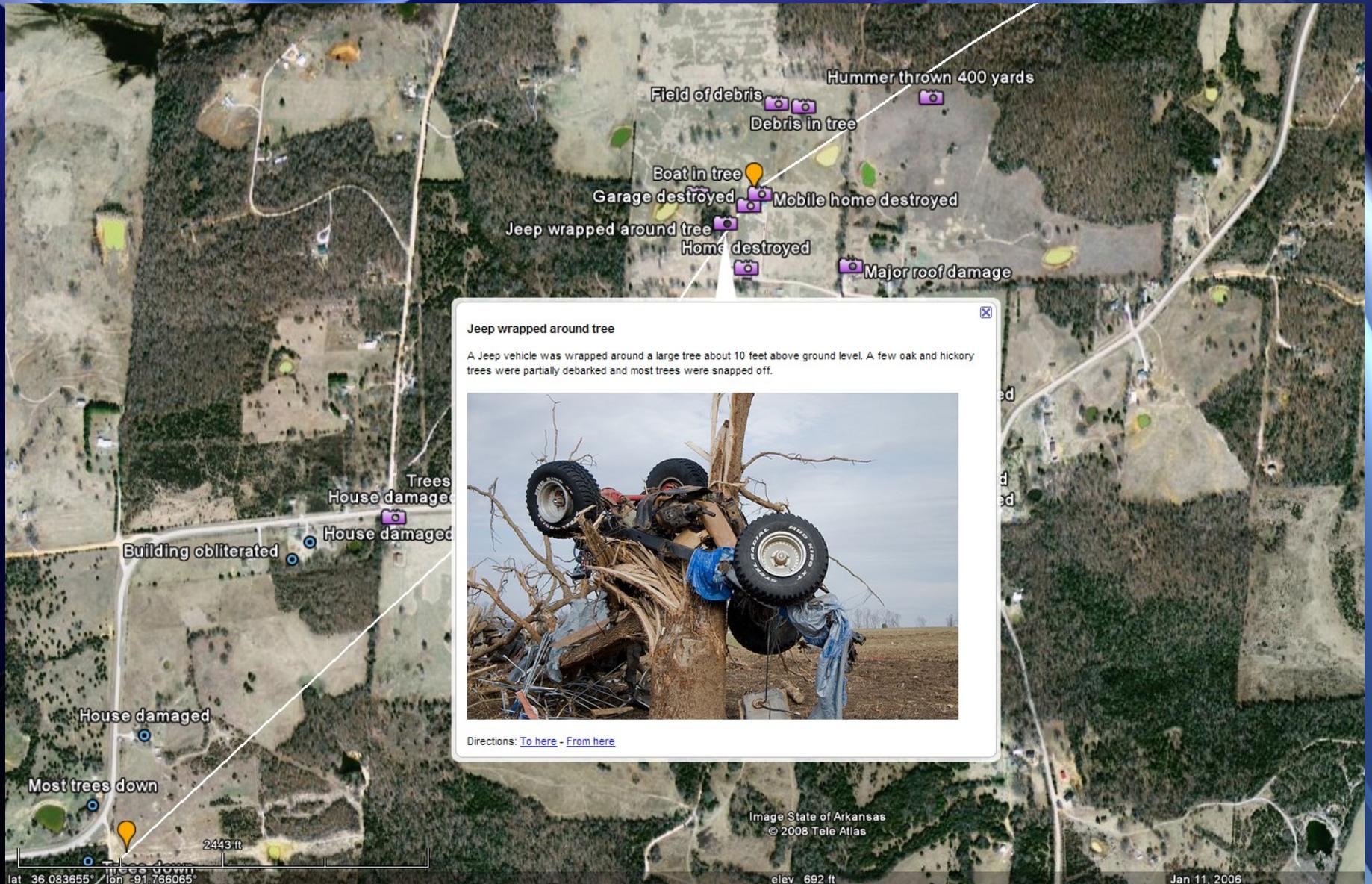
- ◆ **Survey teams used laptops with GPS units**
 - ◆ **Recorded the center coordinates of the track**
 - ◆ **Recorded the edge coordinates of the track**
 - ◆ **This was used later to determine the width of the tornado at each point**
 - ◆ **The level of damage was surveyed at each location using the EF scale**
 - ◆ **Many photos were taken**
- ◆ **Data was brought back to the**

Track Created

- ◆ Data from GPS units imported into Google Earth
- ◆ Connecting lines drawn representing the path
- ◆ Icons used to represent points surveyed
- ◆ Color coded to represent strength on the EF Scale

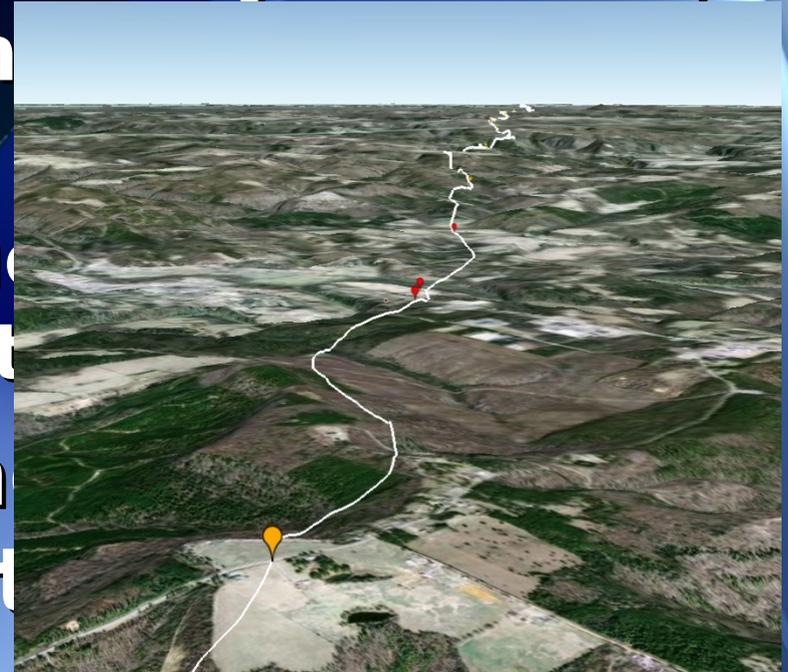


Details and Photos Added

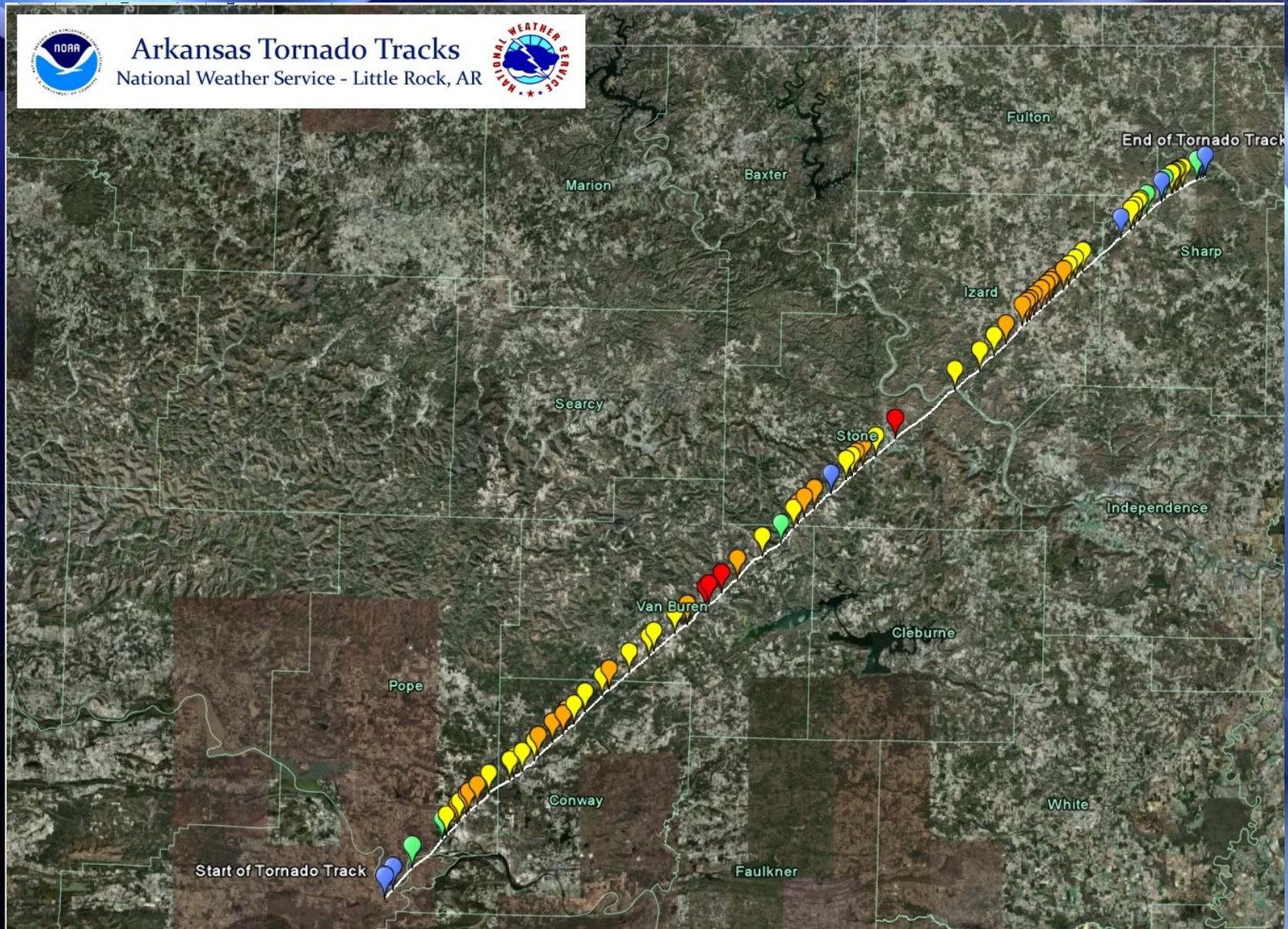


Aerial and Orbital Imagery

- ◆ Data from aerial and orbital imagery was used to adjust the tornado track in remote areas, and between survey locations
- ◆ Aerial missions conducted by the NWS, Arkansas Forestry Com, FEMA, and others
- ◆ Orbital imagery from go and commercial satellites
- ◆ Result was an extremely detailed depiction of the tornado track

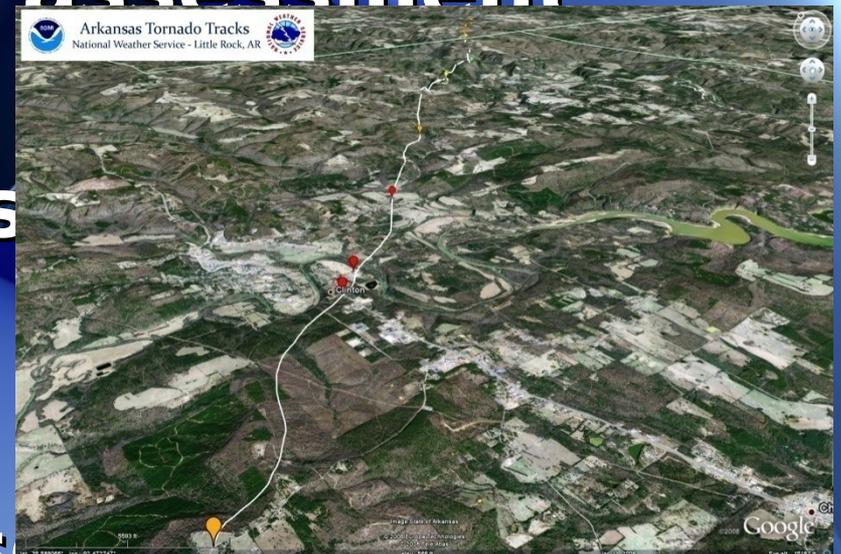


Finished Product



Realized Benefits

- ◆ **Greatly increased tornado track accuracy**
- ◆ **Data was quickly shared**
- ◆ **Helped first responders pinpoint areas of need**
- ◆ **Assisted our damage assessment teams**
- ◆ **Government agencies aid recipients**
- ◆ **Scientific study**
- ◆ **Used by the private sector for various purposes**

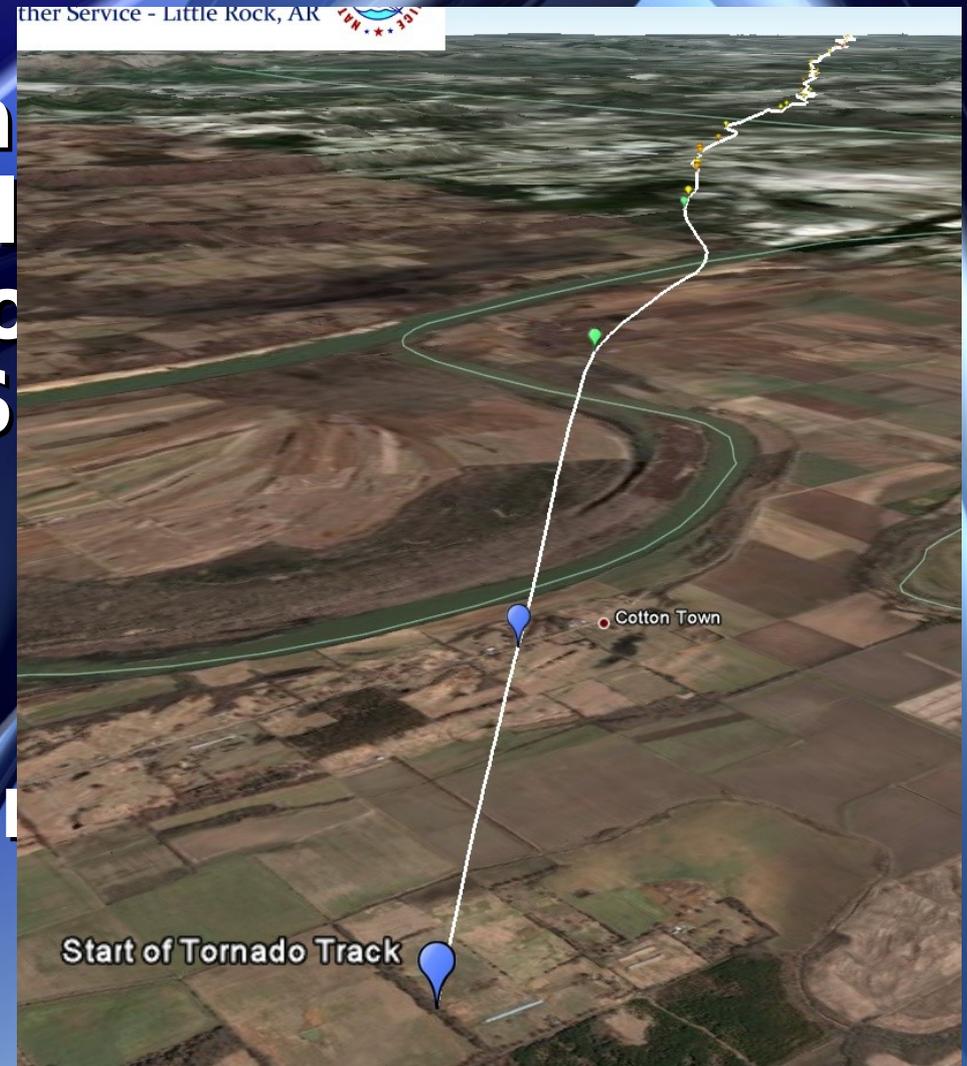


1 Week Later

- ◆ **We had a highly accurate depiction of all the tornado tracks from the Super Tuesday Outbreak**
- ◆ **The long-track tornado received the most attention**
 - ◆ **No other tornado track -- at any time or any place -- had ever been recorded in this much detail**

Tornado Track Detail

- ◆ Most tornado tracks are depicted as straight lines
- ◆ Creating the tornado tracks using detailed GPS points and plotting the data using GIS software, you can see that this is clearly not the case
- ◆ Tornadoes do not travel in straight lines!



Continuing Efforts

- ◆ **With the success of our efforts on February 5th, we continued to produce GIS datasets for every tornado**
- ◆ **Immediately after each event, initial data was shared with the Arkansas Geographic Information Office**
 - ◆ **They would share data with interested parties**
 - ◆ **Data posted to our web site**
- ◆ **Daily updates were performed until surveys were completed**

Local Web Page – GIS Portal

National Weather Service Forecast Office
Little Rock, AR

SR News SRH Home Organization Search Enter Search Here

Local weather forecast by "City, St" or zip code
 City, St

Current Hazards
 Local Hazards Page
 National

Current Conditions
 Observations
 Satellite Images
 Rivers & Lakes AHPS
 Precip Estimate
 Hydrology

Radar Imagery
 Little Rock
 Local Radar Page
 Nationwide

Forecasts
 Activity Planner
 Local Forecast Page
 Aviation
 Fire Weather

Climate
 Local
 National
 More...

Tropical Weather
 Local Tropical Page
 Hurricane Center

Weather Safety
 Storm Ready

Top News of the Day
 Big Events (2008)/Reports: Jul | Others
[GIS Data Portal/Lightning Safety](#)
 Hurricane Outlook (2008)/Going Somewhere?
[More News/Public Info Statement \(Jul 20\)](#)

N LITTLE ROCK/100 PM CDT [More Conditions](#)

Temp: 95F (HX 98)	RH: 37%	Wind: N2	Baro: 30.00F
----------------------	------------	-------------	-----------------

No Ozone Advisory/Alert

Other Forecasts: [Graphical](#) / [Tabular](#) [Point](#) / [Tabular](#) [State](#) [Submit a Storm Report](#)

Click on the map below for the latest forecast. [En Español](#)

Read watches, warnings & advisories. [Zoom Out](#)

Heat Advisory
 Air Quality Alert
 Hazardous Weather Outlook

Last map update: Mon, Jul. 21, 2008 at 2:03:46 pm CDT

Point Forecasts

Cities in Arkansas	Coordinates (make sure "Lon" is negative)
<input type="text" value="Pick a City"/>	Lat: <input type="text"/> Lon: <input type="text"/>

The following files (containing tornado tracks) are for use with GIS software. The KMZ (compressed KML) files are intended for applications such as [Google Earth](#). The ZIP files contain several [shapefiles](#) for applications such as [ArcView](#). Right click on the link(s) of your choice and "Save Link As" or "Save Target As" to your computer. View using the appropriate application(s).

For a description of each event, including damage photos...click on the HTML link provided.

Links of Interest			
Event	KMZ	ZIP	HTML
February 5th	KMZ	ZIP	HTML
April 3rd-4th	KMZ	ZIP	HTML
April 8th-10th	KMZ	ZIP	HTML
May 2nd	KMZ	ZIP	HTML
May 10th	KMZ	ZIP	HTML

National GIS Data

KML/KMZ and shapefiles are available on a national level for current weather, past weather, forecast information, fire weather and more.

Links of Interest
GIS Data Portal (plus GIS FAQs)
National KML/KMZ page
National Shapefile Page

[Back to Main](#)
<http://www.srh.noaa.gov/lzk/html/gisdata.htm>

www.srh.noaa.gov/lzk/html/gisdata.htm

In the Future

- ◆ The National Weather Service will allow all field offices to begin submitting tornado track data in a GIS format in October, 2009
 - ◆ No more straight lines!

Actual Track



123 miles



Storm Data Track

121.84 miles

Contact Information

- ◆ **John Robinson**
Warning Coordination
Meteorologist
john.robinson@noaa.gov